Empirical Link between Growth and Remittance: Evidence from panel data

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Abstract

This study investigates the relationship between migrants' remittances and economic growth for a panel of some Asian countries namely; Bangladesh, India, Pakistan and the Philippines. Panel unit root tests were conducted to check stationarity of data. Panel cointegration techniques are employed to examine the long run relationship between variables. Findings indicate long run positive relationship between the two variables meaning remittance inflow spur economic growth in these countries. However, use of remittances in more productive sectors such as infrastructure, education, health might contribute to reducing poverty in the short run in these countries especially in small economies like Bangladesh, Pakistan and the Philippines. Even large economy like India has every potential to be benefitted from remittance income and also from the reverse brain drain that started in India only recently.

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1. Introduction

Remittances increased ten-fold over a period of last ten years and small developing countries received over 18 percent of the total remittances during the period with remittances growing to nearly 50% of GDP within certain countries. These money transfers have been and will continue to be a major source of capital inflows for developing these small economies and will reach millions of households in the next decade. The importance of such flows and the potential multiplier effect cannot be understated for these countries.
The mobility of people across countries has been burgeoning at a rapid speed. It has become a defining phenomenon for development of human race today. Migrants' remittances in recent years is being recognized as a potential source for development in their countries of origin as well as in host countries. Total workers' remittances rose from US$ 1.5 billion in 1975 to US$ 325 billion in 2008 (World Bank, 2011a and 2011b). Despite some decline in 2009, it is expected to rise again up to the level of 2008 by the end of 2010. Remittances have proved to be reasonably stable, less pro-cyclical and more reliable source of capital flows for the developing countries. This staggering growth in remittance flow into developing countries prompted researchers across the globe to investigate remittances' short run and long run impact on the economic development of remittance receiving countries.

South and Southeast Asia have been an important source of migrant workers for countries suffering from labor shortages and migrants' remittances have become a very significant source of export income for this region. Within South Asia and Southeast Asia, Bangladesh, India, Pakistan and the Philippines have been the major source of migrant workers who are spread all over the world. Among these countries, the Philippines is the 3rd largest, India the second largest, Bangladesh and Pakistan the 6th largest remittance recipients in the world. The remittance inflow to these countries combinedly account for more than 30% of total remittances channeled into developing countries. Bangladesh Pakistan and India have experienced remarkable increase in remittance flow in the last three decades. Remittance flows are the second largest source of external funding for Pakistan behind FDI and have already proved to have played an important role for economic development. Foreign exchange reserve has significantly stabilized Pakistan's financial sector (Qayuum et. al. 2008). During the 1990's, decline in remittance inflows was a major contributor in increasing poverty in Pakistan (Siddiqui and Kamal, 2002). Remittance earning increased from US$1 billion in 2000 to US$10 billion in 2010. India experienced a period of stagnation in remittance inflow during the period from 1980 to 1991. But from the year of 1991, the remittance inflow grew significantly. In the year, 2010, India's remittance earning crossed US$54 billion.

The Philippines is one of the countries in the world which has a long history of sending workers abroad. Its remittance earning constitutes more than 10% of its total GDP (Ang, 2007). In 2009, the number of Filipinos living and working abroad has exceeded 10% of its total population. Called Overseas Filipino Workers (or OFWs), they are recognized as modern heroes in the Philippines. Bangladesh has sent more than 6.7 million workers to over 140 countries since mid-70's (Mamun and Nath, 2010), most of them to some middle eastern countries. Around 2.5 million Bangladeshi people are working in the oil-rich Saudi Arabia alone. Yearly remittance inflow exceeded US$10 billion in the last couple of years which is more than 10% of Bangladesh's GDP. From the above discussion, it is clearly evident that Bangladesh, India,

Pakistan and the Philippines constitute the biggest chunk of world's migrant workers. Only a few studies involving these countries have been conducted to examine remittance-growth interaction so far and hence a vacuum exists in this area. Our paper is an attempt to fill this gap. In addition, to the best of our knowledge, not a single other paper has simultaneously involved time series and panel data in one single study and also we used one of the longest sample periods (32 years) for such study so far for these countries.

The rest of the paper is structured as follows; Section 2 discusses empirics while section 3 is dedicated to econometric methodology and results. The paper concludes with summary and conclusions in section 4.

2. Empirics

In the recent past, there has been a flurry of interest in the relationship between migration and development. Migration and its associated flow of remittances have drawn special attention from policy makers and scholars around the world. Most of the country level studies relying on household data yielded insights into how remittances impact at the micro level. Macro empirical literature on remittances mainly focused on growth, poverty, inequality and output growth volatility. Most of the studies on remittances used household, cross country and panel data to examine the effects of remittances. Despite sizeable volume of literature, the role of remittances in enhancing economic growth is still in dispute.

So far, three strands of confrontational literature exist on the role of remittances. Recent empirical works have generally argued that remittances have a positive effect on economic growth in developing countries (Jahid et al., 2012; Das, 2012; Azam and Khan, 2011; Das and Chowdhury, 2011; Mohamed and Sidiropoulos, 2010; Pradhan et al., 2008; Loxley and Sackey, 2008; Giuliano and Ruiz-Arranz, 2009; Ziesmer, 2006). Rao and Hasan (2011) in a study of an unbalanced panel of 40 countries analyzed the direct growth effects of remittances and the channels through which remittances affect growth. Their findings suggest that although there have short to medium term transitory growth effects, there is no long run growth effects of remittances. The findings are consistent with those of Giudiano and Ruiz Arranz (2009).

Naiditch and Vrancianu (2010) in a study of 25 countries from Eastern Europe and Central Asia show that an increase in migrant income lead to an increase in optional invested remittances by migrants. Eckstein (2010) illustrates how and why a full understanding of remittances rests on examining dynamics at both the individual, societal and institutional state level. It also points to the importance of understanding remittances in historical context with particular reference to Cuba. Paterno and Bugamelli (2009) attempted to identify the causal impact of worker's remittances on current account reversals. They showed that worker's remittances help reduce the probability of current account reversals. Based on the findings, they recommend that efforts to reduce the cost and the risk of transferring workers' remittances across countries should be on our political agenda both at national and international levels. Gupto, Patillo and Wagh (2009) analyzes the effect of remittances at the aggregate level in sub-Saharan Africa. The study found that remittances have a direct poverty-mitigating effect and a positive impact on financial development.

Hung-Ju Chen (2009) developed a migration model to find that when the probability of migration is dependent upon prior average human capital, the average human capital threshold is a crucial determinant of economic growth. The finding further suggests that if households perceive that there is high probability of migration in the future, they will invest more in their education enriching human capital which will eventually induce higher probability of migration. Adams Jr. and John Page (2005) showed that international migration and remittances have a strong, statistically significant impact on reducing poverty in the developing world. Another finding of the same study suggests that international migration and remittances may be endogenous to poverty meaning the variations in poverty in developing countries cause changes in both the share of migrants going to work abroad and in the level of official international remittances sent home. Remittances have positive effect not only on level and growth rates of GDP per capita but also on the rates of savings and public expenditure (Ziesemer, 2010).

Despite the fact that most of the studies advocated remittances' positive effect in developing countries, critics argue that growth effects of remittances is either negative or at best zero. Chami et al. (2003) in a study on 113 countries found negative relationship between remittances and economic growth. This negative relationship was further supported in two other studies by Brajas et al. (2009) and Rajan and Subramaniam (2005). An IMF study in 2005 on 101 countries found no statistical link between remittances and economic growth. In another study on 114 countries, Catrinescu et al. (2009) found neither positive nor negative relationship. Also the findings of Rahman's (2009) study on Bangladesh, Pakistan, India and Sri Lanka appeared inconclusive. The above discussion on the empirics on remittances and economic growth unfolds the fact that the effect of remittances on economic growth is mixed.

Although plenty of literature on remittance-growth relationship exist now, the volume of country level studies still is relatively scarce. Some country level times series studies also supported the positive effect of remittances (Salahuddin and Alam, 2011; Ahmed and Salahuddin, 2009 for Bangladesh, Qayyum et al., 2008 and Javid et al. 2012 for Pakistan, Ang, 2007 for the Philippines). Paul, et al. (2011) showed that output alone determined long run movements in remittances in a positive direction in the last 35 years. Mamun and Nath (2010) suggested that at household level, remittances reduce poverty while they have significant effect on macro variables in Bangladesh. In a discussion paper, Siddique et. al (2010) showed that growth in remittances does not lead to economic growth in Bangladesh. Ahmed and Walmsley (2009) show that remittances boost net income in welfare in India.

3. Econometric methodology and results

We obtain data on remittances and per capita GDP from World Bank Development Indicators Database, 2010 published by the World Bank (WB 2010) for the period from 1977 to 2009 and constructed a balanced panel. Per capita GDP is taken at 2000 constant dollar prices while remittances is considered at current US dollars. Logarithmic transformation of both variables has been done to handle heteroscedasticity and other problems.

The main objective of our study is to examine the long run relationship between economic growth and migrants' remittances. The testing procedure involves four steps. The first step is to test whether the variables contain a unit root, the second step is to test whether there is a long run co integrating relationship between the variables.

Table 1 shows the descriptive statistics and correlation matrix of our data for all countries under study showing that the data are fairly dispersed. Three panel unit root tests proposed by Im et al. (2003), Maddala and Wu (1999) and Breitung (2000) were conducted to see whether the variables in the panel contain unit root. The IPS test assumes that all countries converse towards the equilibrium value at different speeds under the alternative hypothesis. The IPS test statistic for unit root is;

$$t-bar = \sqrt{N}\left(t_{\alpha} - k_{t}\right)\sqrt{V_{t}}$$

where N is the size of the panel, t_{α} is the average of the individual ADF t-statistics for each of the countries with and without trend and k_t and v_t are respectively the estimates of the mean and variance of each $t_{\alpha i}$. Maddala and Wu (1999) proposed a panel ADF unit root test based on Fisher (1932). The Fisher ADF test essentially combines the p values of the test statistic for a unit root in each residual cross-sectional unit. The test has a chi-square distribution with 2 degrees of freedom.

The test statistic is; $\chi = -2\sum_{i=1}^{N} \log_e \pi_i$ Here, π_i is the p value of the test statistic for unit i.

The Breitung (2000) panel unit root test has the following form;

$$y_{it} = \alpha_{it} + \sum_{k=1}^{p+1} \beta_{ik} X_{i,t-k} + \varepsilon_t$$

Using transformed vectors, Breitung (2000) constructed the following t-statistic

$$\chi_{\mathbf{B}} = \frac{\sum_{i=1}^{N} \sigma_1^{-2} Y_i^{*\prime} X_i^{*\prime}}{\sqrt{\sum_{i=1}^{N} \sigma_1^{-2} X_i^{*\prime} A' A X_i^{*}}}$$

The panel unit root results are reported in table 2. Both series in the panel were found 1st difference stationary i.e. they contain unit root.

Insert table 2

Panel Cointegration

Since both series belong to I(1) process, next we proceed to examine whether there is a long-run relationship between the variables. As we assume our panel to be neither perfectly homogeneous (mainly due to the presence of India which broadly differs from other countries in the panel in

terms of size of GDP, financial development etc.) nor perfectly heterogeneous (mainly due to the fact that Bangladesh, Pakistan and the Philippines have similar financial structures), we employ Kao (1999) residual cointegration test (assuming homogeneity) and Pedroni (1997, 1999, 2000) cointegration test (assuming heterogeneity). Kao test rejects the null of no cointegration while 6 out of 7 statistics in the Pedroni test reject the null of no cointegration. The Johansen Fisher panel cointegration test aggregates the p values of individual Johansen maximum eigenvalues and trace statistics. The value of the chi-square statistic is based on the Mackinnon et al. (2001) p values for Johansen's (1988) cointegration trace test and maximum eigenvalue test. The result indicates one cointegrating vector. The results of all three tests are reported in tables 3, 4 and 5.

Insert tables 3, 4, 5

Table 6 reports panel OLS (POLS) estimates. The coefficient of the relationship between remittances and economic growth appeared with expected positive sign meaning there is long run positive relationship between migrants' remittances and economic growth in the panel.

Insert table 6

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4. Summary and Conclusions

We used panel data (1977-2009) for Bangladesh, India, Pakistan and the Philippines-some of the major recipients of remittance income which constitutes more than 30% of the world's total remittance earning by developing countries. Although there has not yet been any consensus on the relationship between remittances and economic growth, most of the studies found significant positive relationship between them (Javid et al., 2012, Das 2012, Das and Chowdhury, 2011, Paul et al., 2011, Adenutsi, 2011,Castello and Boike, 2011).

Having found that the variables contain unit root, we proceeded by employing three popular panel cointegration tests namely Kao test, Panel Pedroni test and Johansen Fisher panel cointegration test-all indicating cointegrating relationship between the variables. Panel OLS estimates also suggest a positive relationship between the variables. The use of remittances in more productive sectors such as infrastructure, education, health might contribute to reducing poverty in these countries in the short run especially in small economies like Bangladesh, Pakistan and the Philippines. Even large economy like India has every potential to be benefitted from remittance income and also from the reverse brain drain that started only recently. Future panel studies on the growth effect of remittances involving developing countries are expected to focus on transmission mechanism and formal channels through which the influence of remittances on growth could be investigated in a more precise way helping developing countries with more sound and effective remittance policies.

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Table 1: Descriptive Statistics & Correlation

	Mean	Median			Std.	IND_GD	IND_RE

			Maximum	Minimum	Dev.	P	M
IND_GDP	26.49656	26.43403	27.49743	25.7162	0.543678	1	0.755866
IND_REM	18.65834	18.6237	19.80782	17.9263	0.509086	0.755866	1

	Mean	Median	Maximum	Minimum	Std. Dev.	PAK_GDP	PAK_REM
PAK_GDP	24.71209	24.78129	25.43708	23.81936	0.470151	1	-0.74004
PAK_REM	17.64086	17.46385	18.75736	16.19042	0.721915	-0.74004	1

	Mean	Median	Maximum	Minimum	Std. Dev.	PHI_GDP	PHI_REM
PHI_GDP	24.86819	24.77123	25.43941	24.43008	0.297503	1	0.838254
PHI_REM	16.66857	16.70122	17.42273	15.90242	0.45527	0.838254	1

	Mean	Median	Maximum	Minimum	Std. Dev.	PHI_GDP	PHI_REM
PHI_GDP	24.86819	24.77123	25.43941	24.43008	0.297503	1	0.838254
PHI_REM	16.66857	16.70122	17.42273	15.90242	0.45527	0.838254	1

Table 2: Panel Unit Root Tests

	GDP	Remittance
Level		
Im, Pesaran and Shin W-stat	2.30	2.72
Breitung t-stat	-2.85	-1.28
ADF - Fisher Chi-square	1.80	10.76
1st Difference		
Im, Pesaran and Shin W-stat	-8.17***	-7.72***
Breitung t-stat	-4.35***	-4.35***
ADF - Fisher Chi-square	63.73***	69.77***

Table 3

Kao Residual Cointegration Test

Series: GDP REMITTANCE
Date: 01/31/12 Time: 14:24
Sample: 1977 2009
Included observations: 132
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Lag selection: Automatic 7 lags by SIC with a max lag of 8
Newey-West bandwidth selection using Bartlett kernel

	t-Statistic	Prob.
ADF	1.214422	0.1123
Residual variance	2.30E+20	
HAC variance	8.47E+20	

Table 4: Pedroni Cointegration Test

		Panel Pedroni Cointegration test	Weighted	
Statistic	Prob.		Statistic	Prob.
15.62421	0.0000	Panel v-Statistic	6.268983	0.0000
-4.530048	0.0000	Panel rho-Statistic	0.702974	0.7590
-4.736273	0.0000	Panel PP-Statistic	0.549875	0.7088
1.468174	0.9290	Panel ADF-Statistic	1.880117	0.9700
Statistic	Prob.	Alternative		

		hypothesis: individual AR coefs. (between-dimension)
0.790726	0.7854	
0.730047	0.7673	Group rho-Statistic
2.178070	0.9853	Group PP-Statistic
		Group ADF-Statistic

Table 5: Johansen Fisher panel cointegration test

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Statistic* (from trace test)	Prob.	Fisher Statistic* (from max-eigen test)	Prob.
None	37.23	0.000	19.33	0.0132
At most 1	37.65	0.000	37.65	0.0000

Table 6: Panel OLS

Panel OLS estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LREM	5.68E+08	1.48E+08	3.844746	0.0002
C	-3.95E+08	2.34E+09	-0.168423	0.8665

R-squared	0.105000	Mean dependent var	7.52E+09
Adjusted R-squared	0.097897	S.D. dependent var	1.33E+10
S.E. of regression	1.26E+10	Akaike info criterion	49.37065
Sum squared resid	2.01E+22	Schwarz criterion	49.41521
Log likelihood	-3157.721	Hannan-Quinn criter.	49.38875
F-statistic	14.78207	Durbin-Watson stat	0.251749
Prob(F-statistic)	0.000191		